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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>5</sup> :</b>  <b>C25D 15/02</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 91/02831</b>  <b>(43) International Publication Date:</b> 7 March 1991 (07.03.91)
<b>(21) International Application Number:</b> PCT/NL90/00121 <b>(22) International Filing Date:</b> 20 August 1990 (20.08.90)  <b>(30) Priority data:</b> 8902107                      21 August 1989 (21.08.89)                      NL  <b>(71)(72) Applicants and Inventors:</b> DE BOKS, Christiaan [NL/NL]; Zanddreef 6, NL-4841 LD Prinsenbeek (NL). GLASS, Bernard [BE/BE]; Van Eijcklei 2, B-2018 Antwerpen (BE).  <b>(74) Agent:</b> HOORWEG, P., N.; Arnold & Siedsma Octrooibureau, Sweelinckplein 1, 2517 GK The Hague (NL).  <b>(81) Designated States:</b> AT (European patent), BE (European patent), CH (European patent), DE (European patent)*, DK (European patent), ES (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US.		<b>Published</b> <i>With international search report.</i>
<b>(54) Title:</b> STRIKING IMPLEMENT FOR A BALL GAME AND METHOD FOR MANUFACTURING SUCH AN IMPLEMENT  <b>(57) Abstract</b>  <p>A method for hardening the surface of a striking implement for a ball game, for instance a golf club, hockey stick and the like, consisting of a handgrip portion and a striking face for the ball located at a distance therefrom, wherein the implement or a platen member intended therefor is immersed in an electrolytic bath filled with electrolyte, wherein granular material like diamond is prepared, such that metal-ions like nickel-ions can be used as carrier for the grains like diamond grains after an electrical voltage has been applied in the electrolyte, whereupon the grains like diamond grains are deposited on the surface of the implement.</p> <div style="text-align: right;"> </div>		

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**STRIKING IMPLEMENT FOR A BALL GAME AND METHOD FOR  
MANUFACTURING SUCH AN IMPLEMENT**

The invention relates to a striking implement and a method for hardening the surface of a striking implement for a ball game, for instance a golf club, hockey stick and the like, comprising a hand-grip portion and a  
5 striking face for the ball located at a distance therefrom.

The invention has for its object to improve such an implement such that the striking face with which the ball is repeatedly brought into contact displays not only  
10 a high wear resistance but also a determined strength and stiffness, so that in respect of direction, speed and spin no undesired deflections are given to the ball as a consequence of deformations in the striking implement caused by wear.

The method according to the invention is distinguished in that the implement or a platen member intended therefor is immersed in an electrolytic bath filled with electrolyte, wherein granular material like diamond is prepared, such that metal-ions like nickel-ions can be  
15 used as carrier for the diamond grains after an electrical voltage has been applied in the electrolyte, whereupon the diamond grains are deposited on the surface of the implement.  
20

The granular material must hereby possess a great  
25 wear resistance and must be of a size such that a continuous wear resistant surface is created on at least the striking face.

The granular material can according to the invention be a part of the base material from which the  
30 striking implement is manufactured, but the hardening means can also be applied in the form of a layer on the base material of the implement.

This arranging of granular hardening means can take place by electrolytic means if the base material of

the striking implement is suitable therefor.

It is on the other hand possible to arrange the granular hardening means on a platen member suitable for electrolytic treatment, which plate is arranged on the  
5 base material of the striking implement, this being of importance if the latter consists for example of plastic or wood.

Finally, the invention proposes to use as granular material, as diamond grains, having dimensions varying  
10 between 0.001 and 1 mm, said granular material being deposited.

The invention is further elucidated with reference to several embodiments of striking implements provided with a wear resistant hard layer according to the  
15 invention. In the drawing:

fig. 1, 2 and 3 show perspective views of respectively a golf club, a hockey stick and a baseball bat.

Each of the striking implements for the associated ball games shown in the drawing have a striking face that  
20 can be curved as well as flat. The striking face is designated in the drawing with the numeral 1, on which face a portion is covered with a wear resistant layer 2 which is composed according to the invention of granular material displaying a great hardness. In the case of the  
25 baseball bat the hard surface 2 is the same as the striking face 1.

The deposition of the granular material can according to the invention be carried out by electrolytic means, whereby via electrolysis the granular material is  
30 deposited on the base material of the striking implement. This latter can be realized if the base material of the striking implement is suitable for an electrolytic treatment.

If this is not the case, for instance with a  
35 wooden club or a wooden hockey stick as in fig. 2, a separate plate 4 can then be arranged on the striking side of the hockey stick. This plate can have a certain

thickness and is provided on the outer side with electrolytically applied granular material.

It has been found that as granular material diamond powder is highly suitable because the granular  
5 particles possess a great hardness and wear resistance.

The applying of a layer of granular diamond material can be performed by electrolysis.

The electrolytic coating with diamond is carried out by means of baths filled with a certain liquid  
10 comprising metal-ions as electrolyte. Diamond grains prepared for this purpose are brought in the bath and are on the workpiece after the workpiece has been suspended in the bath and an electric voltage is applied to the electrolytic. Suitable metal-ions, for example nickel-ions,  
15 hereby serves as carrier for the diamond grains.

The invention is not limited to the above described embodiments.

Claims

1. Method for hardening the surface of a striking implement for a ball game, for instance a golf club, hockey stick and the like, consisting of a handgrip portion and a striking face for the ball located at a distance therefrom, characterized in that the implement or a platen member intended therefor is immersed in an electrolytic bath filled with electrolyte, wherein granular material like diamond is prepared, such that metal-ions like nickel-ions can be used as carrier for the grains like diamond grains after an electrical voltage has been applied in the electrolyte, whereupon the grains like diamond grains are deposited on the surface of the implement.

2. Method according to claim 1, wherein the grain size varies between 0.001 and 1 mm.

3. Striking implement manufactured according to the method of claim 1 or 2, characterized in that said striking face is provided with hardening means in the form of grains.

4. Implement as claimed in claim 3, characterized in that the hardening means are arranged in the form of a layer on the base material of said implement.

5. Implement as claimed in claims 1 and 2, characterized in that the layer is formed by an electrolytic sensitive plate with the granular material for depositing thereon.

6. Implement as claimed in any of the foregoing claims, characterized in that the grains of the hardening means are formed by diamonds.

- 1 / 1 -

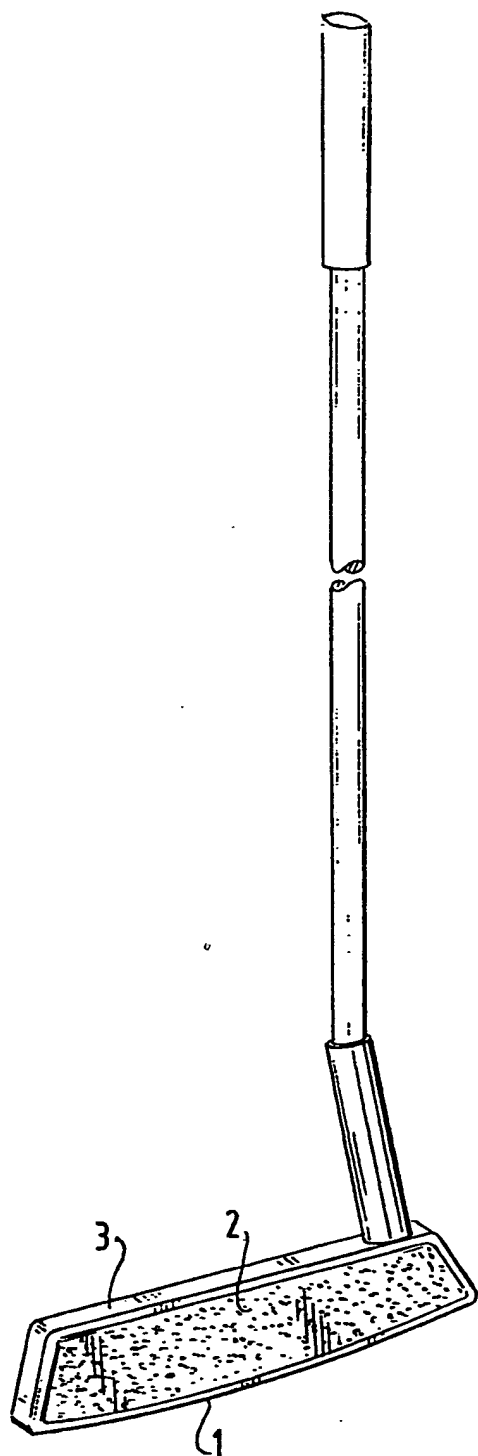


FIG. 1

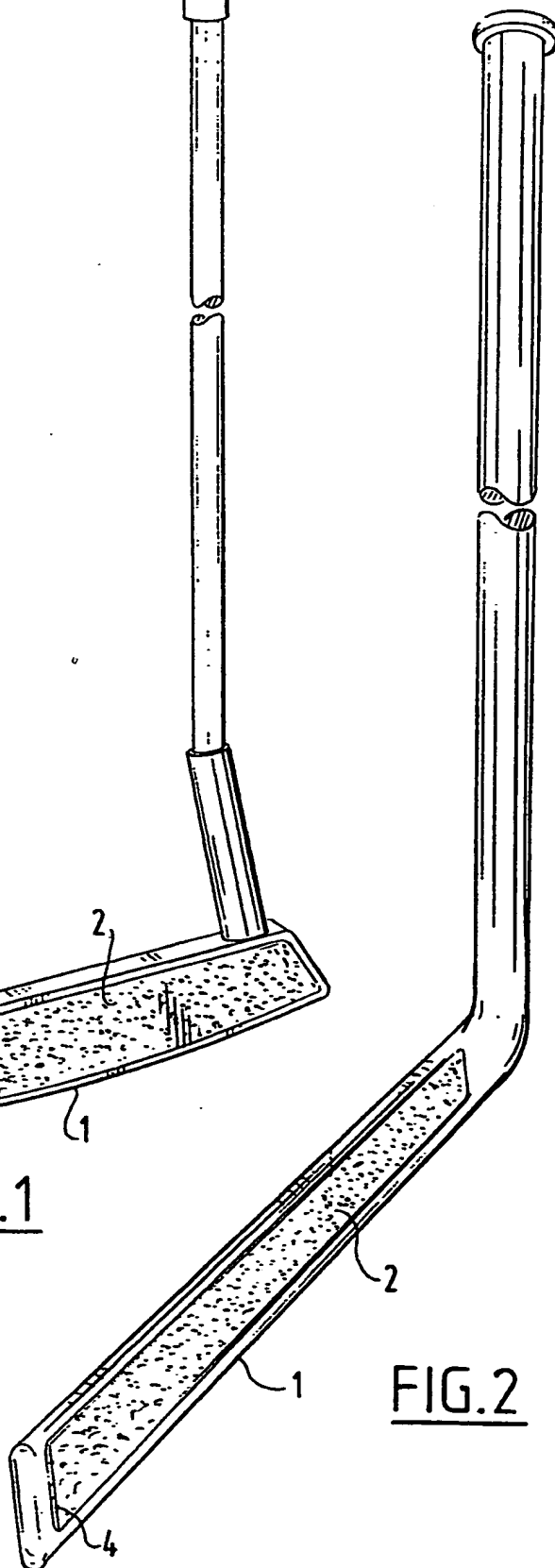


FIG. 2

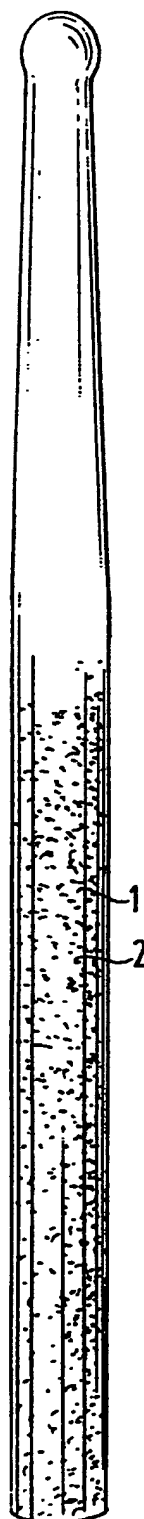


FIG. 3



# INTERNATIONAL SEARCH REPORT

International Application No PCT/NL 90/00121

<b>I. CLASSIFICATION F SUBJECT MATTER</b> (If several classification symbols apply, indicate all) <sup>6</sup> According to International Patent Classification (IPC) or to both National Classification and IPC <b>IPC<sup>5</sup>: C 25 D 15/02</b>																				
<b>II. FIELDS SEARCHED</b> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Minimum Documentation Searched <sup>7</sup></div> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 20%; border-bottom: 1px solid black;">Classification System</th> <th style="border-bottom: 1px solid black;">Classification Symbols</th> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px; vertical-align: top;">IPC<sup>5</sup></td> <td style="padding: 5px; vertical-align: top;">C 25 D, A 63 B</td> </tr> </table> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>8</sup></div>			Classification System	Classification Symbols	IPC <sup>5</sup>	C 25 D, A 63 B														
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<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT <sup>9</sup></b> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%; border-bottom: 1px solid black;">Category <sup>9</sup></th> <th style="border-bottom: 1px solid black;">Citation of Document, <sup>11</sup> with Indication, where appropriate, of the relevant passages <sup>12</sup></th> <th style="width: 10%; border-bottom: 1px solid black;">Relevant to Claim No. <sup>13</sup></th> </tr> </thead> <tbody> <tr> <td style="text-align: center; vertical-align: top;">Y</td> <td>US, A, 4768787 (C. SHIRA) 6 September 1988 see column 1, lines 54-68; column 2, line 60 - column 3, line 6; column 4, lines 20-26 --</td> <td style="text-align: center; vertical-align: top;">1-3,6</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">Y</td> <td>GB, A, 2014189 (BRISTOL LTD) 22 August 1979 see page 1, lines 6-24, 55-73; page 3, lines 17-22 --</td> <td style="text-align: center; vertical-align: top;">1-3,6,4</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">A</td> <td>GB, A, 1329081 (BRISTOL LTD) 5 September 1973 see page 1, lines 20-30; page 2, lines 7-10 --</td> <td style="text-align: center; vertical-align: top;">1</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">A</td> <td>US, A, 3989.861 (W. RASMUSSEN) 2 November 1976 see abstract; column 1, lines 32-37; column 2, lines 6-9, 42-50 --</td> <td style="text-align: center; vertical-align: top;">1</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">Y</td> <td>GB, A, 1062769 (DUNLOP CY LTD) 22 March 1967 see page 1, lines 30-37; page 2, lines 9-12, 48-64 ./.</td> <td style="text-align: center; vertical-align: top;">4</td> </tr> </tbody> </table>			Category <sup>9</sup>	Citation of Document, <sup>11</sup> with Indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>	Y	US, A, 4768787 (C. SHIRA) 6 September 1988 see column 1, lines 54-68; column 2, line 60 - column 3, line 6; column 4, lines 20-26 --	1-3,6	Y	GB, A, 2014189 (BRISTOL LTD) 22 August 1979 see page 1, lines 6-24, 55-73; page 3, lines 17-22 --	1-3,6,4	A	GB, A, 1329081 (BRISTOL LTD) 5 September 1973 see page 1, lines 20-30; page 2, lines 7-10 --	1	A	US, A, 3989.861 (W. RASMUSSEN) 2 November 1976 see abstract; column 1, lines 32-37; column 2, lines 6-9, 42-50 --	1	Y	GB, A, 1062769 (DUNLOP CY LTD) 22 March 1967 see page 1, lines 30-37; page 2, lines 9-12, 48-64 ./.	4
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<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><sup>10</sup> Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 50%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"G" document member of the same patent family</p> </div> </div>																				
<b>IV. CERTIFICATION</b> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black; padding: 5px;">           Date of the Actual Completion of the International Search  <b>14th November 1990</b> </td> <td style="width: 50%; border-bottom: 1px solid black; padding: 5px;">           Date of Mailing of this International Search Report  <b>10. 12. 90</b> </td> </tr> <tr> <td style="border-bottom: 1px solid black; padding: 5px;">           International Searching Authority  <b>EUROPEAN PATENT OFFICE</b> </td> <td style="border-bottom: 1px solid black; padding: 5px;">           Signature of Authorized Officer   <b>miss T. MORTENSEN</b> </td> </tr> </table>			Date of the Actual Completion of the International Search <b>14th November 1990</b>	Date of Mailing of this International Search Report <b>10. 12. 90</b>	International Searching Authority <b>EUROPEAN PATENT OFFICE</b>	Signature of Authorized Officer <b>miss T. MORTENSEN</b>														
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**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		EP-A- 0318565	07-06-89
		JP-T- 1503760	21-12-89
		WO-A- 8810135	29-12-88
GB-A- 2014189	22-08-79	BE-A- 872974	21-06-79
		CA-A- 1133848	19-10-82
		DE-A,C 2855054	05-07-79
		FR-A,B 2412626	20-07-79
		FR-A- 2551461	08-03-85
		JP-A,B,C54115643	08-09-79
		NL-A- 7812367	25-06-79
		US-A- 4305792	15-12-81
GB-A- 1329081	05-09-73	None	
US-A- 3989861	02-11-76	None	
GB-A- 1062769		BE-A- 665978	
		CH-A- 438542	
		DE-B- 1279258	
		FR-A- 1445003	
		NL-A- 6508200	27-12-65
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